AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, of claims in the application:

LISTING OF CLAIMS

1. (Original) A method for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, comprising the computer-implemented steps of:

marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

determining an achieved flow bandwidth for the data flow based on data traffic within the network;

determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.

2. (Original) The method as recited in Claim 1, wherein:

the step of marking a first group of one or more packets includes the step of storing a first differentiated services codepoint (DSCP) value in each header of the first group of one or more packets of a data flow;

the step of determining a second behavioral treatment value includes the step of determining a second DSCP value; and

the step of marking a second group of one or more packets includes the step of storing the second DSCP value in each header of the second group of one or more packets of a data flow.

3. (Original) The method as recited in Claim 1, further comprising the steps of:

determining packet flow characteristics of the first group of one or more packets of a data flow; and

determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow.

4. (Original) The method as recited in Claim 1, further comprising the steps of:

establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and

generating the first behavioral treatment value based on the established QoS policy.

5. (Original) A computer-readable medium carrying one or more sequences of instructions for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

determining an achieved flow bandwidth for the data flow based on data traffic within the network;

determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.

6. (Original) The computer-readable medium as recited in Claim 5, wherein:

the step of marking a first group of one or more packets includes the step of storing a first differentiated services codepoint (DSCP) value in each header of the first group of one or more packets of a data flow;

the step of determining a second behavioral treatment value includes the step of determining a second DSCP value; and

the step of marking a second group of one or more packets includes the step of storing the second DSCP value in each header of the second group of one or more packets of a data flow.

7. (Original) The computer-readable medium as recited in Claim 5, further comprising instructions for performing the steps of:

determining packet flow characteristics of the first group of one or more packets of a data flow; and

determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow.

8. (Original) The computer-readable medium as recited in Claim 5, further comprising instructions for performing the steps of:

establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and

generating the first behavioral treatment value based on the established QoS policy.

9. (Original) A computer apparatus comprising:

a processor; and

a memory coupled to the processor, the memory containing one or more sequences of instructions for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by the processor causes the processor to perform the steps of:

marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment

value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

determining an achieved flow bandwidth for the data flow based on data traffic within the network;

determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.

10. (Original) The computer apparatus as recited in Claim 9, wherein:

the step of marking a first group of one or more packets includes the step of storing a first differentiated services codepoint (DSCP) value in each header of the first group of one or more packets of a data flow;

the step of determining a second behavioral treatment value includes the step of determining a second DSCP value; and

the step of marking a second group of one or more packets includes the step of storing the second DSCP value in each header of the second group of one or more packets of a data flow.

11. (Original) The computer apparatus as recited in Claim 9, further comprising instructions for performing the steps of:

determining packet flow characteristics of the first group of one or more packets of a data flow; and

determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow.

12. (Original) The computer apparatus as recited in Claim 9, further comprising instructions for performing the steps of:

establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and

generating the first behavioral treatment value based on the established QoS policy.

13. (Original) A network device configured for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, comprising:

means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

means for determining an achieved flow bandwidth for the data flow based on data traffic within the network;

means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.

14. (Original) A method for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, comprising the computer-implemented steps of:

causing one or more network devices to mark a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

determining an achieved flow bandwidth for the data flow based on data traffic within the network;

determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

causing one or more network devices to mark a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.

15. (Previously Presented) The method as in claim 1, wherein the first behavioral treatment is determined without regard to the achieved flow bandwidth.

16. (Previously Presented) The method as in claim 1, wherein the second behavioral treatment is a behavioral treatment that provides a lower level of service than other available choices of behavioral treatments; and
wherein the second behavioral treatment provides a high enough level of service to accommodate the achieved flow bandwidth.

17. (Previously Presented) The method as in claim 1, wherein the second behavioral treatment is a behavioral treatment that provides a minimum level of service that is a sufficient level of service to accommodate the achieved flow bandwidth.

18. (Previously Presented) The method as in claim 1, wherein the step of marking the first group is performed by at least communicating the first behavioral treatment to a differentiated services node located at a border of a differentiated services domain; and
wherein the step of marking the second group is performed by at least communicating the second behavioral treatment to the differentiated services node.

19. (Previously Presented) A method as in claim 1, further comprising repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth.

20. (Previously Presented) A method as in claim 1, further comprising repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth multiple times, therein enhancing efficiency of the network on an on going basis.

21. (Currently Amended) The method as in claim 1, wherein the step of determining the achieved flow bandwidth is performed by at least estimating the achieved flow bandwidth based on Management Information Base (MIB) variables.

22. (Currently Amended) The method as in claim 1, wherein the step of determining the achieved flow bandwidth is performed by at least checking a Transfer Control Protocol/ Internet Protocol (TCP/IP) window size and determining a value for the achieved flow bandwidth based on the TCP/IP window size.

23. (Previously Presented) The method as in claim 1, wherein the step of determining the achieved flow bandwidth is based on reception quality feedback from a Real-Time Transport Protocol (RTP) receiver.

24. (Previously Presented) A method for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, comprising the computer-implemented steps of:

marking a first group of packets of a plurality of data flows with an initial set of behavioral treatment values, wherein the first set of behavioral treatment values direct devices within the network to treat the first group packets with an initial set of quality of service treatments;

determining achieved flow bandwidths, wherein an achieved flow bandwidth is determined for each of the plurality of data flows based on data traffic within the network;

determining an updated set of behavioral treatment values based on the achieved flow bandwidths within the network; and

after the steps of marking the first group and determining the updated set of behavioral treatment values, marking a second group packets of said plurality of data flows with said updated set of behavioral treatment values, wherein the updated set of behavioral treatment values direct devices within the network to treat the second group of packets with an updated set of quality of service treatments.

25. (Previously Presented) A method for performing packet marking comprising the computer-implemented steps of:

defining an initial set of Quality of Service (QoS) values for coloring packets within a plurality of data flows, wherein each of the QoS values indicates an allocation of bandwidth;

coloring a first group of one or more packets of a given data flow selected from the plurality of data flows, without regard to an achieved flow bandwidth, by at least

communicating the initial set of QoS values to each of one or more edge differentiated services domain nodes that are located at one or more edges of a differentiated services domain, and

the one or more edge differentiated services domain nodes using one or more of the initial set of QoS values to color the first group;

estimating traffic bandwidth within the network based on bandwidth information corresponding to a current traffic pattern of the network, wherein the traffic bandwidth estimated includes an achieved flow bandwidth for the given data flow;

determining an updated set of QoS values for coloring packets within the plurality of data flows, based on the traffic bandwidth estimated,

wherein the updated set of QoS values provide lower levels of service than other available choices of QoS values, and

wherein the updated set of QoS values provide a high enough level of service to accommodate the traffic bandwidth estimated;

coloring a subsequent group of one or more packets of the given data flow with the one or more of updated set of QoS values by at least

communicating the updated set of QoS values to each of one or more edge differentiated services domain nodes, and

the one or more edge differentiated services domain nodes using one or more of the updated set of QoS values to color the subsequent group;

repeating the steps of estimating traffic bandwidth, determining an updated set of QoS values, and coloring a subsequent group multiple time, therein tuning the network on an ongoing basis.

26. (Previously Presented) The method as in claim 24, wherein the initial set of QoS values is an initial set of Differentiated Services Codepoint (DSCP) values;

wherein the updated set of QoS values is an updated set of DSCP values;

wherein the step of estimating traffic bandwidth further comprises the steps of:

defining one or more QoS policies that specify target bandwidth values and a range of possible services for each the plurality of data flows, wherein a given target bandwidth value is specified for the given data flow, and wherein the given target bandwidth identifies a specific bandwidth that is desirous or required by the given data flow;

gathering information about the traffic bandwidth; and

determining the traffic bandwidth based on the information gathered.

27. (New) The method of claim 1, wherein the data flow is associated with only one behavioral treatment at any given time.

28. (New) The method of claim 24, wherein each data flow is associated with only one behavioral treatment at any given time.

29. (New) The method of claim 1, wherein the achieved flow bandwidth is a percentage of the network bandwidth

30. (New) The method claim 29, wherein the second behavioral treatment results in the dataflow having a different achieved flow bandwidth, which is a different percentage of the network bandwidth.

31. (New) The method of claim 1, wherein the determining of the second behavioral treatment is in response to a determination of achieved flow bandwidth resulting form the determining of the achieved flow bandwidth.

32. (New) The computer-readable medium as in claim 5, wherein the first behavioral treatment is determined without regard to the achieved flow bandwidth.

33. (New) The computer-readable medium as in claim 5, wherein the second behavioral treatment is a behavioral treatment that provides a lower level of service than other available choices of behavioral treatments; and
wherein the second behavioral treatment provides a high enough level of service to accommodate the achieved flow bandwidth.

34. (New) The computer-readable medium as in claim 5, wherein the second behavioral treatment is a behavioral treatment that provides a minimum level of service that is a sufficient level of service to accommodate the achieved flow bandwidth.

35. (New) The computer-readable medium as in claim 5, wherein the step of marking the first group is performed by at least communicating the first behavioral treatment to a differentiated services node located at a border of a differentiated services domain; and
wherein the step of marking the second group is performed by at least communicating the second behavioral treatment to the differentiated services node.

36. (New) A computer-readable medium as in claim 5, wherein the method further comprises repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth.

37. (New) A computer-readable medium as in claim 5, wherein the method further comprises repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth multiple times, therein enhancing efficiency of the network on an on going basis.

38. (New) The computer-readable medium as in claim 5, wherein the step of determining the achieved flow bandwidth is performed by at least estimating the achieved flow bandwidth based on Management Information Base (MIB) variables.

39. (New) The computer-readable medium as in claim 5, wherein the step of determining the achieved flow bandwidth is performed by at least checking a Transfer Control Protocol/ Internet Protocol (TCP/IP) window size and determining a value for the achieved flow bandwidth based on the TCP/IP window size.

40. (New) The computer-readable medium as in claim 5, wherein the step of determining the achieved flow bandwidth is based on reception quality feedback from a Real-Time Transport Protocol (RTP) receiver.

41. (New) A computer-readable medium carrying one or more sequences of instructions for marking one or more packets of data in a packet-switched network

based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the method comprising:

marking a first group of packets of a plurality of data flows with an initial set of behavioral treatment values, wherein the first set of behavioral treatment values direct devices within the network to treat the first group packets with an initial set of quality of service treatments;

determining achieved flow bandwidths, wherein an achieved flow bandwidth is determined for each of the plurality of data flows based on data traffic within the network;

determining an updated set of behavioral treatment values based on the achieved flow bandwidths within the network; and

after the steps of marking the first group and determining the updated set of behavioral treatment values, marking a second group packets of said plurality of data flows with said updated set of behavioral treatment values, wherein the updated set of behavioral treatment values direct devices within the network to treat the second group of packets with an updated set of quality of service treatments.

42. (New) A computer-readable medium carrying one or more sequences of instructions for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the method comprising:

defining an initial set of Quality of Service (QoS) values for coloring packets within a plurality of data flows, wherein each of the QoS values indicates an allocation of bandwidth;

coloring a first group of one or more packets of a given data flow selected from the plurality of data flows, without regard to an achieved flow bandwidth, by at least

communicating the initial set of QoS values to each of one or more edge differentiated services domain nodes that are located at one or more edges of a differentiated services domain, and

the one or more edge differentiated services domain nodes using one or more of the initial set of QoS values to color the first group;

estimating traffic bandwidth within the network based on bandwidth information corresponding to a current traffic pattern of the network, wherein the traffic bandwidth estimated includes an achieved flow bandwidth for the given data flow;

determining an updated set of QoS values for coloring packets within the plurality of data flows, based on the traffic bandwidth estimated,

wherein the updated set of QoS values provide lower levels of service than other available choices of QoS values, and

wherein the updated set of QoS values provide a high enough level of service to accommodate the traffic bandwidth estimated;

coloring a subsequent group of one or more packets of the given data flow with the one or more of updated set of QoS values by at least

communicating the updated set of QoS values to each of one or more edge differentiated services domain nodes, and

the one or more edge differentiated services domain nodes using one or more of the updated set of QoS values to color the subsequent group;

repeating the steps of estimating traffic bandwidth, determining an updated set of QoS values, and coloring a subsequent group multiple time, therein tuning the network on an ongoing basis.

43. (New) The computer-readable medium as in claim 41, wherein the initial set of QoS values is an initial set of Differentiated Services Codepoint (DSCP) values;

wherein the updated set of QoS values is an updated set of DSCP values;

wherein the step of estimating traffic bandwidth further comprises the steps of:

defining one or more QoS policies that specify target bandwidth values and a range of possible services for each the plurality of data flows, wherein a given target bandwidth value is specified for the given data flow, and wherein the given target bandwidth identifies a specific bandwidth that is desirous or required by the given data flow;

gathering information about the traffic bandwidth; and

determining the traffic bandwidth based on the information gathered.

44. (New) The computer-readable medium of claim 5, wherein the data flow is associated with only one behavioral treatment at any given time.

45. (New) The computer readable medium of claim 41, wherein each data flow is associated with only one behavioral treatment at any given time.

46. (New) The computer-readable medium of claim 5, wherein the achieved flow bandwidth is a percentage of the network bandwidth

47. (New) The computer-readable medium claim 46, wherein the second behavioral treatment results in the dataflow having a different achieved flow bandwidth, which is a different percentage of the network bandwidth.

48. (New) The computer-readable medium of claim 5, wherein the determining of the second behavioral treatment is in response to a determination of achieved flow bandwidth resulting form the determining of the achieved flow bandwidth.

49. (New) The computer apparatus as in claim 9, wherein the first behavioral treatment is determined without regard to the achieved flow bandwidth.

50. (New) The computer apparatus as in claim 9, wherein the second behavioral treatment is a behavioral treatment that provides a lower level of service than other available choices of behavioral treatments; and

wherein the second behavioral treatment provides a high enough level of service to accommodate the achieved flow bandwidth.

51. (New) The computer apparatus as in claim 9, wherein the second behavioral treatment is a behavioral treatment that provides a minimum level of service that is a sufficient level of service to accommodate the achieved flow bandwidth.

52. (New) The computer apparatus as in claim 9, wherein the step of marking the first group is performed by at least communicating the first behavioral treatment to a differentiated services node located at a border of a differentiated services domain; and

wherein the step of marking the second group is performed by at least communicating the second behavioral treatment to the differentiated services node.

53. (New) A computer apparatus as in claim 9, wherein the method further comprises repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth.

54. (New) A computer apparatus as in claim 9, wherein the method further comprises repeating the step of determining the achieved flow bandwidth and steps that follow the step of determining the achieved flow bandwidth multiple times, therein enhancing efficiency of the network on an on going basis.

55. (New) The computer apparatus as in claim 9, wherein the step of determining the achieved flow bandwidth is performed by at least estimating the achieved flow bandwidth based on Management Information Base (MIB) variables.

56. (New) The computer apparatus as in claim 9, wherein the step of determining the achieved flow bandwidth is performed by at least checking a Transfer Control Protocol/ Internet Protocol (TCP/IP) window size and determining a value for the achieved flow bandwidth based on the TCP/IP window size.

57. (New) The computer apparatus as in claim 9, wherein the step of determining the achieved flow bandwidth is based on reception quality feedback from a Real-Time Transport Protocol (RTP) receiver.

58. (New) A computer apparatus comprising:

a processor; and

a memory coupled to the processor, the memory containing one or more sequences of instructions for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by the processor causes the processor to perform the method including at least:

marking a first group of packets of a plurality of data flows with an initial set of behavioral treatment values, wherein the first set of behavioral treatment values direct devices within the network to treat the first group packets with an initial set of quality of service treatments;

determining achieved flow bandwidths, wherein an achieved flow bandwidth is determined for each of the plurality of data flows based on data traffic within the network;

determining an updated set of behavioral treatment values based on the achieved flow bandwidths within the network; and

after the steps of marking the first group and determining the updated set of behavioral treatment values, marking a second group packets of said

plurality of data flows with said updated set of behavioral treatment values, wherein the updated set of behavioral treatment values direct devices within the network to treat the second group of packets with an updated set of quality of service treatments.

59. (New) A computer apparatus comprising:

a processor; and

a memory coupled to the processor, the memory containing one or more sequences of instructions for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, wherein execution of the one or more sequences of instructions by the processor causes the processor to perform the method including at least:

defining an initial set of Quality of Service (QoS) values for coloring packets within a plurality of data flows, wherein each of the QoS values indicates an allocation of bandwidth;

coloring a first group of one or more packets of a given data flow selected from the plurality of data flows, without regard to an achieved flow bandwidth, by at least

communicating the initial set of QoS values to each of one or more edge differentiated services domain nodes that are located at one or more edges of a differentiated services domain, and

the one or more edge differentiated services domain nodes using one or more of the initial set of QoS values to color the first group;

estimating traffic bandwidth within the network based on bandwidth information corresponding to a current traffic pattern of the network, wherein the traffic bandwidth estimated includes an achieved flow bandwidth for the given data flow;

determining an updated set of QoS values for coloring packets within the plurality of data flows, based on the traffic bandwidth estimated,

wherein the updated set of QoS values provide lower levels of service than other available choices of QoS values, and

wherein the updated set of QoS values provide a high enough level of service to accommodate the traffic bandwidth estimated;

coloring a subsequent group of one or more packets of the given data flow with the one or more of updated set of QoS values by at least

communicating the updated set of QoS values to each of one or more edge differentiated services domain nodes, and

the one or more edge differentiated services domain nodes using one or more of the updated set of QoS values to color the subsequent group;

repeating the steps of estimating traffic bandwidth, determining an updated set of QoS values, and coloring a subsequent group multiple time, therein tuning the network on an ongoing basis.

60. (New) The computer apparatus as in claim 58, wherein the initial set of QoS values is an initial set of Differentiated Services Codepoint (DSCP) values;

wherein the updated set of QoS values is an updated set of DSCP values;

wherein the step of estimating traffic bandwidth further comprises the steps of:

defining one or more QoS policies that specify target bandwidth values and a range of possible services for each the plurality of data flows, wherein a given target bandwidth value is specified for the given data flow, and wherein the given target bandwidth identifies a specific bandwidth that is desirous or required by the given data flow;

gathering information about the traffic bandwidth; and

determining the traffic bandwidth based on the information gathered.

61. (New) The computer apparatus of claim 9, wherein the data flow is associated with only one behavioral treatment at any given time.

62. (New) The computer apparatus of claim 58, wherein each data flow is associated with only one behavioral treatment at any given time.

63. (New) The computer apparatus of claim 9, wherein the achieved flow bandwidth is a percentage of the network bandwidth

64. (New) The computer apparatus claim 63, wherein the second behavioral treatment results in the dataflow having a different achieved flow bandwidth, which is a different percentage of the network bandwidth.

65. (New) The computer apparatus of claim 9, wherein the determining of the second behavioral treatment is in response to a determination of achieved flow bandwidth resulting form the determining of the achieved flow bandwidth.